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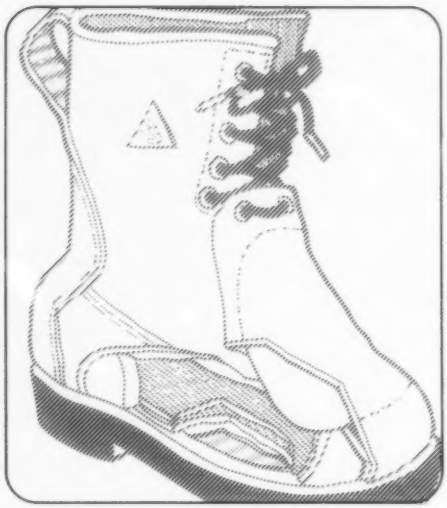

PUTTING A SAFE FOOT FORWARD

Foot Comfort and Safety at Work

P91-3E

by
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1. INTRODUCTION: THE PROBLEM

Foot troubles may be perceived as minor but they are not a trivial matter, especially at work. As the old saying goes, "When your feet hurt, you hurt all over." This bears the wisdom of legions of sufferers.

There are two major categories of work-related foot injuries. First are foot injuries from punctures, crushing, sprains, and lacerations. They account for ten percent of all reported disabling injuries.

Second are injuries from slips, trips and falls. They account for fifteen percent of all reported disabling injuries. Slips and falls do not always result in a foot injury, but lack of attention to foot safety plays an important role in their occurrence.

These two categories of foot injuries, however, do not exhaust the whole range of foot problems at work. There are also some other conditions such as calluses, ingrown toenails or, simply, tired feet that are common among workers. Although these may not be considered as occupational injuries in the strictest sense, they can have serious consequences for health and safety at the workplace. They cause discomfort, pain and fatigue. Fatigue sets up the worker for further injuries affecting the muscles and joints. Also, a worker who is tired and suffering pain is less alert and more likely to act unsafely. An accident of any kind may result.

This publication focuses on various aspects of foot problems at work and suggests ways to improve comfort and prevent foot injuries.

2. CAUSES OF FOOT PROBLEMS

Some foot problems are so common that they can occur in virtually any workplace and under any working conditions.

Foot Problems	Common causes
Severely aching feet, blisters, calluses, corns, rheumatism, arthritis, malformations of toes, fallen arches (flat feet) bunions, sprains	Long periods of standing, hard flooring, poorly fitted footwear: - high heels - pointed shoes - lack of arch support - too loose or too tight footwear
Sweaty feet, fungal infections (athlete's foot)	Hot and humid environment, streuous work, footwear with synthetic (non-porous) uppers

There are no comprehensive statistics on these kinds of problems with feet. Surveys suggest, though, that two out of every three workers suffer from some form of foot problem.

These common foot problems occur both on and off the job. Still, there is no doubt that some work-related factors contribute to their onset.

Jobs that require long periods of standing contribute largely. Because the human foot is designed for mobility, maintaining an upright stance is extremely tiring. Standing for hours on end, day after day, not only tires the worker's feet, but can also cause permanent damage. Continuous standing can cause the joints or bones of the feet to become misaligned (flat feet is an example), and can cause inflammation which can lead later to rheumatism and arthritis .

The type of flooring used in the workplace has an important influence on comfort, especially on tender feet. Hard unyielding floors, like concrete, are the least comfortable surfaces to work on. Working on a hard floor has the impact of a hammer, pounding the heel at every step.

Slippery floors are hazardous for slips and falls, with twisted or sprained ankles or broken or fractured feet as a result.

Footwear that fits poorly or is in disrepair also contributes heavily to foot discomfort. Pointed

toes and high heels are particularly inappropriate for working footwear.

Prolonged standing, hard flooring and inappropriate footwear are common working conditions. Many jobs, even those that are traditionally considered "safe" for feet, involve them. Are there jobs that are safe for feet? Statistics show there aren't, really. Among teachers and workers in clerical occupations that belong to "safe" jobs, foot injuries account for from fifteen percent to over twenty percent of all disabling injuries. Lack of awareness of the need for foot protection in workplaces like schools or offices can play a role in the onset of foot problems.

Other categories of foot injuries are those related to the hazards of specific workplaces or working conditions.

Injuries	Common Causes
Crushed or broken feet, amputations of toes or feet	Feet trapped between objects or caught in a crack, falls of heavy objects, moving vehicles (lift trucks, bulldozers, etc.), conveyors belts (feet drawn between belt and roller)
Punctures of the sole of the foot	Loose nails, sharp metal or glass objects
Cuts or severed feet or toes, lacerations	Chain saws, rotary mowers, unguarded machinery
Burns	Molten metal splashes, chemical splashes, contact with fire, flammable or explosive atmospheres
Electric shocks	Static electricity, contact with sources of electricity
Sprained or twisted ankles, fractured or broken bones because of slips, trips or falls	Slippery floors, littered walkways, incorrect footwear, poor lighting

Additional hazards for foot injury exist in outdoor jobs such as logging, hydro linework or fishing which involve freezing temperatures, or wetness in low temperature: frostbite and trench foot.

3. PREVENTION

There is no workplace where a worker is immune to foot injury. However, the hazards differ depending on the workplace and the types of tasks the worker does.

Most work-related foot problems can be prevented. However, effective prevention requires a broad and complex approach.

In the development of a strategy to reduce foot problems, the first step is to identify hazards at the workplace. Assessment of such hazards should be done for each workplace, regardless of how safe or how dangerous it may seem.

There are several important areas of consideration in foot protection. Perhaps the most obvious is footwear. Less obvious, but equally important, are job and workplace design and workers' awareness of potential injuries in their workplaces.

Job and Workplace Design

Aching, flat or tired feet are common among workers who spend most of their working time standing up.

The leading objective of job design is to avoid fixed positions, especially fixed standing positions. Good job design includes varied tasks, requiring changes in body position and using different muscles. Job rotation, job enlargement and team work are all ways to make work easier on the feet.

- Job rotation moves workers from one job to another. It distributes standing among a group of workers, shortening the time each individual spends standing. However, it must be a rotation where the worker does something completely different, such as walking around or sitting at the next job.
- Job enlargement includes more and different tasks in a worker's duties. If it increases the variety of body positions and motions, the worker has less chance of developing foot problems.
- Team work provides the whole team with more control and autonomy in planning and allocation of the work. Each team member carries a set of various operations to complete the whole product. Team work allows workers to alternate between tasks, hence reducing the risk of overloading feet.
- Rest breaks help to alleviate foot problems where redesigning jobs is impractical. Frequent short breaks are preferable to fewer long breaks.

However, redesigning the job alone will not be effective in reducing foot problems if it is not combined with the proper design of the workplace.

- For standing jobs, an adjustable work surface is the best choice. If the work surface is not adjustable, a platform to raise the shorter worker, or a pedestal to raise the working object for a taller worker, are possible solutions.
- Work station design should allow the worker room to change body position.
- A footrail or footrest enables the worker to shift weight from one leg to the other. This reduces the stress on the lower legs and feet.
- Wherever possible, a worker should be able to work sitting or standing at will. Even when work can only be done standing, a seat should be provided for resting purposes.

For more information on workplace design, refer to the CCOHS publications on Working in a Standing Position (P88-14E) and Working in a Sitting Position (P90-8E).

Job and workplace designs also have the potential to increase foot safety in workplaces that are specifically hazardous. Here are some examples:

- Separating mobile equipment from pedestrian traffic and installing safety mirrors and warning signs can decrease the number of accidents that might result in cut or crushed feet or toes.
- Proper guarding of machines such as chain saws or rotary mowers can avoid cuts or severed feet or toes.
- Effective housekeeping reduces the number of accidents at workplaces where loose nails and other sharp objects, or littered walkways, create the hazard of foot injury. For more information on this topic, refer to the CCOHS publication Guide to Workplace Housekeeping (P90-9E).
- Using colour contrast and angular lighting to improve depth vision in complicated areas such as stairs, ramps and passageways reduces the hazard of tripping and falling.

Flooring

An important component of workplace design is flooring. A hard, unyielding floor causes a lot of discomfort. Wood, cork, carpeting, or rubber - anything that provides some resilience - is gentler on workers' feet. Where resilient floors are not practical, footwear with thick insulating soles and shock absorbing insoles can alleviate discomfort. Anti-fatigue matting can also be useful wherever workers have to stand or walk. They provide a cushioning which reduces foot fatigue. However, the use of matting requires caution. When installed improperly, it can lead to tripping and slipping accidents. For more on matting, refer to the CCOHS publication Working in a Standing Position (P88-14E).

Special anti-slip flooring or matting can reduce slipping accidents. If installed properly, these mats are useful, but workers may find that their feet burn and feel sore. The non-slip properties of the flooring mat cause their shoes to grab suddenly on the flooring, making their feet slide forward inside the shoes. Friction inside the shoes produces heat which creates soreness and, eventually, calluses. A non-slip resilient insole can reduce this discomfort.

Footwear

Proper footwear is important, not only for foot comfort but also for general well-being. Improper footwear can cause or aggravate existing foot problems. Good footwear can prevent problems. Yet the fact that working footwear houses and supports the worker's feet for many hours a day is often downplayed in favour of esthetic or fashion decisions.

Training that provides information on the health hazards of wearing improper shoes, the principles of selecting proper ones, and the simple rules of general foot care is the best way to involve workers in protecting their feet.

Good footwear should have the following qualities:

- The inner side of the shoe must be straight from the heel to the end of the big toe.
- The shoe must grip the heel firmly.
- The forepart must allow freedom of movement for the toes.
- The shoe must have a fastening across the instep to prevent the foot from slipping when walking.
- The shoe must have a low, wide-based heel; flat shoes are recommended.

People buying footwear for work should take the following advice:

- Do not expect that footwear which is too tight will stretch with wear.
- Have both feet measured when buying shoes. Feet normally differ in size.
- Buy shoes to fit the bigger foot.
- Buy shoes late in the afternoon when feet are likely to be swollen to their maximum size.
- Ask a doctor's advice if properly fitting shoes are not available.
- Consider using shock-absorbing insoles where the job requires walking or standing on hard floors.

For information on the features that make footwear acceptable, refer to the CCOHS publications Working in a Standing Position: Appendix C, or ERGONOMIC INFOGRAM E-A03.

When selecting footwear, it is also important to keep in mind that tight socks or stockings can cramp the toes as much as poorly-fitted shoes. Wrinkled socks, or socks that are too large or too small, can cause blisters and calluses. White woollen or cotton socks are most often recommended for work, as coloured socks may cause allergies.

Protective Footwear

In designing strategies to protect foot injury, one has to remember the fundamental principle of occupational health and safety: that occupational hazards should be eliminated at the source. The role of personal protective equipment is to minimize exposure to specific occupational hazards, and not to eliminate them. Protective footwear does not guarantee total protection. The CCOHS publication *Effective Personal Protective Equipment Programs, Their Role and Implementation* (P88-2E) discusses personal protective equipment in more detail.

All jurisdictions in Canada require that workers wear adequate protection against workplace hazards. For workers exposed to foot hazards, the required protection is protective footwear certified by the Canadian Standards Association (CSA standard Z-195). Providing adequate protective footwear has proven to be an effective protective strategy. By providing CSA-approved protective footwear and requiring its use, the Ontario construction industry reduced the frequency of foot injuries by sixty percent over the fifteen years between 1968 and 1984.

All working footwear, for both men and women, whether it is safety wear or not, should provide comfort without compromising protective value. In addition, protective footwear should conform with CSA Standard Z-195.

- A steel toe cap should cover the whole length of the toes from tips to beyond the natural bend of the foot. A soft pad covering the edge of the toecap increases comfort. If the toecap cuts into the foot, either the size or style of the footwear is incorrect.
- Soles come in a variety of thicknesses and materials. They need to be chosen according to the hazards and type(s) of flooring in the workplace.
- Uppers of protective footwear come in a variety of materials. Selection should take into account the hazards, and individual characteristics of the worker's foot.
- A steel midsole which protects the foot against penetration by sharp objects should be flexible enough to allow the foot to bend.
- No one type of non-slip footwear can prevent the wearer from slipping on every surface type. Selection should be made to suit the specific working condition.

Working outdoors in cold weather poses a special requirement on selecting the proper footwear.

- "Normal" protective footwear is not designed for cold weather.
- "Insulated" footwear gives little temperature protection in the sole for it has no extra insulation there.
- Loss of heat through steel toe caps (commonly blamed for increased heat loss) is insignificant.

Foot protection against cold weather can be resolved by:

- Insulating the legs by wearing warmers - "dancercise" type.
- Wearing insulating overshoes over working footwear.
- Wearing insulating muffs around the ankles and over the top of the footwear.

For protective footwear there is a balance between the comfort it provides and its guarding role. When this balance is

compromised, the effectiveness of the protective footwear is also compromised.

General Foot Care

Feet are subject to a great variety of skin and toenail disorders. Workers can avoid many of them by following simple rules of foot care:

- Wash feet daily with soap, rinse thoroughly and dry, especially between the toes.
- Trim toenails straight across and not too short. Do not cut into the corners.
- Wear clean socks or stockings and change them daily.

Some feet sweat more than others and are more prone to athlete's foot. Again, following a few simple guidelines may help:

- Select shoes made of leather or canvas - not synthetic materials.
- Keep several pairs of shoes on hand and rotate shoes daily to allow them to air out.
- Wear only non-colored woollen or cotton socks (dyes can cause or aggravate allergies).
- Use foot powder.
- If problems persist, see a doctor.

In cases of persisting ingrown toenails, calluses, corns, fungal infection and more serious conditions such as flat feet and arthritis, see a doctor and follow the doctor's advice.

Exercise

Standing still requires considerable muscular effort. Even so, it is not exercise - only a strain. It does not allow for the alternate contracting and relaxing of muscles of the feet and legs which keeps elasticity and encourages the blood circulation. To keep feet healthy, it is necessary to compensate for working in a fixed, immobilized position.

One action that can be done frequently on the job is to alternately contract and relax the calf muscles, and flex and straighten ankles and knees. Another bit of advice is to walk whenever practical instead of riding. More information on exercise for feet can be obtained from a foot specialist or from a local fitness centre.

4. CONCLUSION

Feet can be both safe and comfortable in the workplace. It is not easy, for there is no readily available formula to follow. Every workplace is unique and therefore requires a unique strategy. As a result identification of the hazards for feet at any given workplace is fundamental. In developing such a strategy, the leading principle should be to control the hazard at the source or, at least, to isolate it from workers. This is achieved by proper job and workplace design.

Selecting and providing protective footwear should be considered as a second line of defence.

It is also important that the worker is informed of hazards in the workplace and of the possible consequences of foot injury.

Cooperation between the workers and management at every stage of planning, design, implementation and evaluation is essential to achieve the goal of healthy, comfortable and safe feet at work.

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